

## SEQUENCE LISTING

<110> Toraya, Tetsuo  
 Tobimatsu, Takamasa  
 Yamanishi, Mamoru  
 Mori, Kouichi  
 Kajiura, Hideki  
 Yamada, Seiki  
 Yuzuki, Michio  
 Azuma, Muneaki  
 Hara, Tetsuya  
 Yasuda, Shinzo

<120> Method for Production of 3-hydroxypropionaldehyde

<130> 08917-116US1

<140> US 10/573,718

<141> 2006-03-27

<150> PCT/JP2004/014213

<151> 2004-09-29

<150> JP 2003-337663

<151> 2003-09-29

<160> 4

<170> PatentIn version 3.1

<210> 1

<211> 7183

<212> DNA

<213> plasmid pBR322

<400> 1

acgttatcga ctgcacggtg caccaatgct tctggcgctca ggcagccatc ggaagctgtg	60
gtatggctgt gcaggctgta aatcactgca taattcgtgt cgctcaaggc gcactcccgt	120
tctggataat gttttttgcg ccgacatcat aacggttctg gcaaattatc tgaaatgagc	180
tgttgacaat taatcatcgg ctcgataat gtgtggaatt gtgagcggat aacaatttca	240
cacaggaaac agtacatatg agatcgaaaa gatttgaagc actggcgaaa cgccctgtga	300
atcaggacgg cttcggttaag gagtggatcg aagaaggctt tatcgcgatg gaaagcccga	360
acgacccaaa accgtcgatt aaaatcgta acggcgcggt gaccgagctg gacgggaaac	420
cggtaaagcga ttttgacctg atcgaccact ttatcgcccg ctacgggtatc aacctgaacc	480
gcgccgaaga agtgatggcg atggattcgg tcaagctggc caacatgctg tgcgatccga	540
acgttaaacg cagcgaaatc gtcccgtga ccaccgcgat gacgccggcg aaaattgtcg	600

aagtggtttc gcatatgaac gtcgtcgaga tgatgatggc gatgcagaaa atgcgcgccc	660
gccgcacccc gtcccagcag gcgcacgtca ccaacgtcaa agataacccg gtacagattg	720
ccgccgacgc cgccgaagg gcatggcgcg gatttgacga acaggaaacc accgttgcg	780
tagcgcgcta tgcgccgttc aacgccatcg cgctgctggg gggctcgag gtaggccgtc	840
cgggcggtgt gacgcagtgc tcgctggaag aagccaccga gctgaagctc ggcatgctgg	900
gccacacctg ctacgccgaa accatctccg tctacggcac cgagccggtc ttaccgacg	960
gcgacgacac gccgtggctg aagggcttcc tcgcctcgtc ctacgcctct cgcgggctga	1020
aaatgcgctt tacctccggc tccggctcgg aagtgcagat gggctacgcc gaaggcaa	1080
ccatgcttta tctggaagcg cgctgcatct acatcaccaa agccgcgggc gtacagggtc	1140
tgcaaaacgg ttccgtaagc tgcacggcg tgccgtctgc ggtgccttcc ggcattcgcg	1200
cggtgctggc ggaaaacctg atctgttcgt cgctggatct ggagtgcgcc tccagcaacg	1260
accagacctt caccactcc gatatgcgtc gtaccgcgcg cctgctgatg cagttcctgc	1320
cgggcaccga ctttatctcc tccggttatt ccgcggtgcc gaactacgac aacatgttcg	1380
ccggctcaa cgaagatgcc gaagactttg acgactaaa cgtcatccag cgcgacctga	1440
aggtggacgg cggtttgctt ccggttcgcg aagaggacgt catcgccatc cgtaacaaag	1500
ccgcccgcgc gctgcaggcc gtgtttgccg gaatggggct gccgccgatt accgatgaag	1560
aagttgaagc cgcgacctac gccacgggtt cgaaagatat gccggagcgc aacatcgctc	1620
aagacatcaa gttcgcccag gaaatcatca ataaaaaccg caacgggtctg gaagtggatga	1680
aagcgctggc gcagggcgga ttcaccgacg tggcccagga catgctcaac atccagaaag	1740
ctaagctgac cggggactac ctgcatacct ccgcgattat cgtcggcgac gggcaggtgc	1800
tgtcagccgt caacgacgtc aacgactatg ccggtccggc aacgggctat cgctgcagg	1860
gcgaacgctg ggaagagatt aaaaacatcc ctggcgctct tgatcccaac gagattgatt	1920
aaggggtgag aaatggaaat taatgaaaaa ttgctgcgcc agataattga agacgtgctc	1980
agcgagatga agggcagcga taaaccggtc tcgtttaatg cgccggcggc ctccgcggcg	2040
ccccaggcca cgccgcccgc cggcgacggc ttcctgacgg aagtgggcga agcgcgtcag	2100
ggaaccacgc aggacgaagt gattatcgcc gtcggcccgg ctttcggcct ggcgcagacc	2160
gtcaatatcg tcggcatccc gcataagagc attttgcgcg aagtcattgc cggattgaa	2220
gaagaaggca ttaaggcgcg cgtgattcgc tgctttaaat cctccgacgt ggccttcgtc	2280
gccgttgaag gtaatcgctt gagcggctcc ggcattctta tcggcatcca gtcgaaaggc	2340

accacggtga tccaccagca ggggctgccg ccgctctcta acctggagct gttcccgcag	2400
gcgccgctgc tgaccctgga aacctatcgc cagatcggca aaaacgccgc ccgctatgcg	2460
aaacgcgaat cgccgcagcc ggtcccgcgc ctgaatgacc agatggcgcg gccgaagtac	2520
caggcgaaat cggccatttt gcacattaaa gagaccaagt acgtggtgac gggcaaaaac	2580
ccgcaggaac tgcgcgtggc gctttgataa aggataactc catgaatacc gacgcaattg	2640
aatcgatggt acgcgacgta ttgagccgca tgaacagcct gcagggcgag gcgcctgcgg	2700
cggctccggc ggctggcggc gcgtcccgta gcgccagggc cagcgactac ccgctggcga	2760
acaagcaccg ggaatgggtg aaaaccgccca ccaataaaaac gctggacgac tttacgctgg	2820
aaaacgtgct gagcaataaa gtcaccgccc aggatatgcg tattaccccg gaaaccctgc	2880
gcttacaggc ttctattgcc aaagacgcgg gccgcgaccg gctggcgatg aacttcgagc	2940
gcgccgccga gctgaccgcg gtaccggacg atcgcattct tgaaatctac aacgccctcc	3000
gcccctatcg ctcgacgaaa gaggagctgc tggcgatcgc cgacgatctc gaaagccgct	3060
atcaggcgaa gatttgccc gctttcgttc gcgaagcggc cacgctgtac gtcgagcgta	3120
aaaaactcaa aggcgacgat taacttcatt ccgggcccgt cgacagatcc ccgggaattc	3180
atcgtgactg actgacgatc tgcctcgcgc gtttcggtga tgacggtgaa aacctctgac	3240
acatgcagct cccggagacg gtcacagctt gtctgtaagc ggatgccggg agcagacaag	3300
cccgtcaggg cgcgtcagcg ggtgttggcg ggtgtcgggg cgagccatg acccagtcac	3360
gtagcgatag cggagtgtat aattcttgaa gacgaaaggg cctcgtgata cgcctatttt	3420
tataggttaa tgtcatgata ataatggttt cttagacgtc aggtggcact tttcggggaa	3480
atgtgcgcgg aaccctatt tgtttatttt tctaaataca ttcaaataatg tatccgctca	3540
tgagacaata accctgataa atgcttcaat aatattgaaa aaggaagagt atgagtattc	3600
aacatttccg tgtcgccctt attccctttt ttgcggcatt ttgccttcct gtttttgctc	3660
accagaaac gctggtgaaa gtaaaagatg ctgaagatca gttgggtgca cgagtgggtt	3720
acatcgaact ggatctcaac agcggtaaga tccttgagag ttttcgcccc gaagaacgtt	3780
ttccaatgat gagcactttt aaagttctgc tatgtggcgc ggtattatcc cgtgttgacg	3840
ccgggcaaga gcaactcggc cgccgcatac actattctca gaatgacttg gttgagtact	3900
caccagtcac agaaaagcat cttacggatg gcatgacagt aagagaatta tgcagtgctg	3960
ccataaccat gagtgataac actgcggccca acttacttct gacaacgacg ggaggaccga	4020

aggagctaac cgcttttttg cacaacatgg gggatcatgt aactcgcctt gatcgttggg	4080
aaccggagct gaatgaagcc ataccaaacg acgagcgtga caccacgatg cctgcagcaa	4140
tggcaacaac gttgcgcaaa ctattaactg gcgaactact tactctagct tcccggcaac	4200
aattaataga ctggatggag gcggataaag ttgcaggacc acttctgcgc tcggcccttc	4260
cggctggctg gtttattgct gataaatctg gagccggtga gcgtgggtct cgcggtatca	4320
ttgcagcact ggggccagat ggtaagccct cccgtatcgt agttatctac acgacgggga	4380
gtcaggcaac tatggatgaa cgaaatagac agatcgtga gatagggtgcc tcaactgatta	4440
agcattggta actgtcagac caagtttact catatatact ttagattgat ttaaaacttc	4500
atttttaatt taaaaggatc taggtgaaga tcctttttga taatctcatg accaaaatcc	4560
cttaacgtga gttttcgctt cactgagcgt cagaccccggt agaaaagatc aaaggatctt	4620
cttgagatcc tttttttctg cgcgtaatct gctgcttgca aacaaaaaaaa ccaccgctac	4680
cagcgggtgg ttgtttgccg gatcaagagc taccaactct ttttccgaag gtaactggct	4740
tcagcagagc gcagatacca aatactgtcc ttctagtgtg gccgtagtta ggccaccact	4800
tcaagaactc tgtagcaccg cctacatacc tcgctctgct aatcctgtta ccagtggctg	4860
ctgccagtgg cgataagtcg tgtcttaccg ggttggtactc aagacgatag ttaccggata	4920
aggcgcagcg gtcgggctga acgggggggtt cgtgcacaca gccagcttg gagcgaacga	4980
cctacaccga actgagatac ctacagcgtg agctatgaga aagcgccacg cttcccgaag	5040
ggagaaaggc ggacaggtat ccggtaaagc gcagggtcgg aacaggagag cgcacgaggg	5100
agcttccagg gggaaacgcc tggatatctt atagtcctgt cgggtttcgc cacctctgac	5160
ttgagcgtcg atttttgtga tgctcgtcag gggggcggag cctatggaaa aacgccagca	5220
acgcggcctt ttacaggctt ctggcctttt gctggccttt tgctcacatg ttctttcctg	5280
cgttatcccc tgattctgtg gataaccgta ttaccgcctt tgagtgaagt gataccgctc	5340
gccgcagccg aacgaccgag cgcagcgagt cagtgaagca ggaagcggaa gagcgctga	5400
tgcggtatct tctccttacg catctgtgcg gtatttcaca ccgcataaat tccgacacca	5460
tcgaatggtg caaaaccttt cgcggtatgg catgatagcg cccggaagag agtcaattca	5520
gggtggtgaa tgtgaaacca gtaacgttat acgatgtcgc agagtatgcc ggtgtctctt	5580
atcagaccgt tccccgcgtg gtgaaccagg ccagccacgt ttctgcgaaa acgcgggaaa	5640
aagtggaagc ggcgatggcg gagctgaatt acattcccaa ccgcgtggca caacaactgg	5700
cgggcaaaca gtcgttgctg attggcggtt ccacctccag tctggcctg cacgcgccgt	5760

cgcaaattgt cgcggcgatt aaatctcgcg ccgatcaact gggtgccagc gtggtggtgt 5820  
 cgatggtaga acgaagcggc gtcgaagcct gtaaagcggc ggtgcacaat cttctcgcg 5880  
 aacgcgtcag tgggctgatc attaactatc cgctggatga ccaggatgcc attgctgtgg 5940  
 aagctgcctg cactaatgtt ccggcgttat ttcttgatgt ctctgaccag acacccatca 6000  
 acagtattat tttctcccat gaagacggta cgcgactggg cgtggagcat ctggtcgc 6060  
 tgggtcacca gcaaatacgcg ctgttagcgg gccattaag ttctgtctcg gcgcgtctgc 6120  
 gtctggctgg ctggcataaa tatctcactc gcaatcaaat tcagccgata gcggaacggg 6180  
 aaggcgactg gaggccatg tccggttttc aacaaaccat gcaaatactg aatgaggggca 6240  
 tcgttccac tgcatgctg gttgccaacg atcagatggc gctgggcgca atgcgcgcca 6300  
 ttaccgagtc cgggctgcgc gttggtgcgg atatctcggg agtgggatac gacgataccg 6360  
 aagacagctc atgttatatc ccgccgttaa ccaccatcaa acaggatttt cgcctgctgg 6420  
 ggcaaaccag cgtggaccgc ttgctgcaac tctctcaggg ccaggcggtg aagggaatc 6480  
 agctgttgcc cgtctcactg gtgaaaagaa aaaccaccct ggcgccaat acgcaaaccg 6540  
 cctctccccg cgcgttgcc gattcattaa tgcagctggc acgacagggt tcccactgg 6600  
 aaagcgggca gtgagcgcaa cgcaattaat gtgagttagc tactcatta ggcacccag 6660  
 gctttacact ttatgcttcc ggctcgatg ttgtgtggaa ttgtgagcgg ataacaattt 6720  
 cacacaggaa acagctatga ccatgattac ggattcactg gccgtcgttt tacaacgtcg 6780  
 tgactgggaa aaccctggcg ttaccaact taatcgctt gcagcacatc cccctttcgc 6840  
 cagctggcgt aatagcgaag aggccgcac cgatcgccct tccaacagt tgcgcagcct 6900  
 gaatggcgaa tggcgctttg cctggtttcc ggcaccagaa gcggtgccgg aaagctggct 6960  
 ggagtgcgat cttcctgagg ccgatactgt cgtcgtcccc tcaaactggc agatgcacgg 7020  
 ttacgatgcg cccatctaca ccaacgtaac ctatccatt acggtcaatc cgccgtttgt 7080  
 tcccacggag aatccgacgg gttgttactc gctcacattt aatgttgatg aaagctggct 7140  
 acaggaaggc cagacgcgaa ttatttttga tggcgttgga att 7183

<210> 2

<211> 6607

<212> DNA

<213> plasmid p15A

<400> 2

gaattaattc tggcgaatcc tctgaccagc cagaaaacga cctttctgtg gtgaaaccgg 60

atgctgcaat tcagagcgcc agcaagtggg ggacagcaga agacctgacc gccgcagagt	120
ggatgtttga catggtgaag actatcgac catcagccag aaaaccgaat tttgctgggt	180
gggctaacga tatccgcctg atgctgaac gtgacggacg taaccaccgc gacatgtgtg	240
tgctgttccg ctgggcatgc caggacaact tctggtccgg taacgtgctg agcccggcca	300
agcttactcc ccatccccct gttgacaatt aatcatcggc tcgtataatg tgtggaattg	360
tgagcggata acaatttcac acaggaaaca ggatcctagg aggtttaaac atatgcgata	420
tatagctggc attgatatcg gcaactcatc gacggaagtc gccctggcga ccctggatga	480
ggctggcgcg ctgacgatca cccacagcgc gctggcgga accaccggaa tcaaaggcac	540
gttgcgtaac gtgttcggga ttcaggaggc gctcgccctc gtcgccagag gcgccgggat	600
cgcgctcagc gatatttcgc tcatccgcat caacgaagcg acgccggtga ttggcgatgt	660
ggcgatggaa accattaccg aaacctcat caccgaatcg accatgatcg gccataaccc	720
gaaaacgccc ggcgggcgcg ggcttggcac aggcatacc attacgccgc aggagctgct	780
aaccgccccg gcggacgcgc cctatatcct ggtggtgtcg tcggcgctcg attttgccga	840
tatcgccagc gtgattaacg ctccctgcg cgccgggtat cagattaccg gcgtcatttt	900
acagcgcgac gatggcgtgc tggtcagcaa ccggctggaa aaaccgctgc cgatcgttga	960
cgaagtgtg tacatcgacc gcattccgct ggggatgtg gcggcgattg aggtcgccgt	1020
tccggggaag gtcatcga aa ccctctctaa cccttacggc atcgccaccg tctttaacct	1080
cagccccgag gagacgaaga acatcgctcc gatggcccgg gcgctgattg gcaaccgttc	1140
cgcggtggtg gtcaaaacgc catccggcga cgtcaaagcg cgcgcgatac ccgccggtaa	1200
tcttgagctg ctggcccagg gccgtagcgt gcgctggat gtggccgccg gcgccgaagc	1260
catcatgaaa gcggtcgacg gctgcggcag gctcgataac gtcaccggcg aatccggcac	1320
caatatcggc ggcattgctg aacacgtgcg ccagaccatg gccgagctga ccaacaagcc	1380
gagcagcgaa atattttattc aggacctgct ggccgttgat acctcggtac cggtgagcgt	1440
taccggcggc ctggccgggg agttctcgct ggagcaggcc gtgggcatcg cctcgatggt	1500
gaaatcggat cgctgcaga tggcaatgat cggccgcgaa atcgagcaga agctcaatat	1560
cgacgtgcag atcgggcgcg cagaggccga agccgccatc ctggggggcg tgaccacgcc	1620
gggcaccacc cgaccgctgg cgatcctcga cctcggcgcg ggctccaccg atgcctccat	1680
catcaacccc aaaggcgaca tcatcgccac ccatctcgcc ggcgagggcg acatggtgac	1740

gatgattatt gcccgcgagc tggggctgga agaccgctat ctggcggaag agatcaagaa	1800
gtacccgctg gctaaggtgg aaagcctggt ccattttacgc cacgaggacg gcagcgtgca	1860
gttctttctcc acgcccgtgc cgcccgcctg gtctgcccgc gtctgcgtgg tgaaaagcgga	1920
cgaactggtg ccgctgcccc gcgatttagc gctggaaaaa gtgcgcgcca ttcgccgcag	1980
cgccaaagag cgggtctttg tcaccaacgc cctgcgcgcg ctgcgtcagg tcagccccac	2040
cggcaacatt cgcgatattc cgttcgtggt gctggtcggc ggttcgtcgc tggatttcga	2100
agtcccgcag ctggtcaccg atgcgctggc gcactaccgc ctggttgccg gacggggaaa	2160
tattcgcggc agcgagggcc ccgaaaacgc ggtggccacc ggctgattc tctcctggca	2220
taaggagttt gcgcatgaac ggtaatcaca gcgccccggc catcgcgatc gccgtcatcg	2280
acggctgcga cggcctgtgg cggaagtgc tgctgggtat cgaagaggaa ggtatccctt	2340
tccggctcca gcatcacccg gccggagagg tcgtggacag cgctggcag gcggcgcgca	2400
gctcgccgt gctggtgggc atgcctgcg accgccatat gctggtcgtg cactacaaga	2460
atttaccgc atcggcgccg ctttttacgc tgatgcatca tcaggacagt caggcccatc	2520
gcaacaccgg taataacgcg gcacggctgg tcaaggggat ccctttccgg gatctgaata	2580
gcgaagcaac aggagaacag caggatgaat aagatctcgg gtagcccgcc taatgagcgg	2640
gctttttttt atgagaatta caacttatat cgtatggggc tgacttcagg tgctacattt	2700
gaagagataa attgcactga aatctagaaa tattttatct gattaataag atgatcttct	2760
tgagatcgtt ttggtctgcg cgtaatctct tgctctgaaa acgaaaaaac cgccttgca	2820
ggcggttttt cgaaggttct ctgagctacc aactcttga accgaggtaa ctggcttgg	2880
ggagcgcagt caccaaaact tgccttttca gtttagcctt aaccggcgca tgacttcaag	2940
actaactcct ctaaataaat taccagtggc tgctgccagt ggtgcttttg catgtctttc	3000
cggtttggac tcaagacgat agttaccgga taaggcgcag cggtcggact gaacgggggg	3060
ttcgtgcata cagtccagct tggagcgaac tgcctaccg gaactgagtg tcaggcgtgg	3120
aatgagacaa acgcggccat aacagcggaa tgacaccggt aaaccgaaag gcaggaacag	3180
gagagcgcac gagggagccg ccagggggaa acgcctggta tctttatagt cctgtcgggt	3240
ttgccacca ctgatttgag cgtcagattt cgtgatgctt gtcagggggg cggagcctat	3300
ggaaaaacgg ctttgccgcg gccctctcac ttccctgtta agtatcttcc tggcatcttc	3360
caggaaatct ccgccccgtt cgtaagccat ttccgctcgc cgcagtcgaa cgaccgagcg	3420
tagcgagtca gtgagcgagg aagcgggaata tctctgtat cacatattct gctgacgcac	3480

cggtgcagcc	ttttttctcc	tgccacatga	agcacttcac	tgacaccctc	atcagtgcca	3540
acatagtaag	ccagtataca	ctccgctagc	gctgatgtcc	ggcggtgctt	ttgccgttac	3600
gcaccacccc	gtcagtagct	gaacaggagg	gacagctgat	agaaacagaa	gccactggag	3660
cacctcaaaa	acaccatcat	acactaaatc	agtaagttgg	cagcatcacc	cgacgcactt	3720
tgcgccgaat	aaatacctgt	gacggaagat	cacttcgcag	aataaataaa	tcctggtgtc	3780
cctgttgata	ccgggaagcc	ctgggccaac	ttttggcgaa	aatgagacgt	tgatcggcac	3840
gtaagagggt	ccaactttca	ccataatgaa	ataagatcac	taccgggctg	atTTTTTgag	3900
ttatcgagat	tttcaggagc	taaggaagct	aaaatggaga	aaaaaatcac	tggatatacc	3960
accgttgata	tatcccaatg	gcacgtaaa	gaacattttg	aggcatttca	gtcagttgct	4020
caatgtacct	ataaccagac	cgttcagctg	gatattacgg	cctttttaaa	gaccgtaaag	4080
aaaaataagc	acaagtttta	tccggccttt	attcacattc	ttgccgcct	gatgaatgct	4140
catccggaat	ttcgatggc	aatgaaagac	ggtgagctgg	tgatatggga	tagtgttcac	4200
ccttgttaca	ccgttttcca	tgagcaaact	gaaacgtttt	catcgctctg	gagtgaatac	4260
cacgacgatt	tccggcagtt	tctacacata	tattcgcaag	atgtggcgtg	ttacggtgaa	4320
aacctggcct	atttccttaa	agggtttatt	gagaatatgt	ttttcgtctc	agccaatccc	4380
tggttgagtt	tcaccagttt	tgattttaa	gtggccaata	tggaacaact	cttcgcccc	4440
gttttcacca	tgggcaaata	ttatacgcaa	ggcgacaagg	tgctgatgcc	gctggcgatt	4500
caggttcatc	atgccgtctg	tgatggcttc	catgtcggca	gaatgcttaa	tgaattacaa	4560
cagtactgcg	atgagtggca	gggcggggcg	taattttttt	aaggcagtta	ttggtgcctt	4620
taaacgcctg	gtgctacgcc	tgaataagtg	ataataagcg	gatgaatggc	agaaattcga	4680
aagcaaattc	gacccggtcg	tcggttcagg	gcagggtcgt	taaatagccg	cttatgtcta	4740
ttgctggttt	accggtttat	tgactaccgg	aagcagtgtg	accgtgtgct	tctcaaatgc	4800
ctgaggccag	tttgctcagg	ctctccccgt	ggaggtaata	attgacgata	tgatcattta	4860
ttctgcctcc	caaagcaatt	ccgacaccat	cgaatgggtg	aaaacctttc	gcggtatggc	4920
atgatagcgc	ccggaagaga	gtcaattcag	ggtggtgaat	gtgaaaccag	taacgttata	4980
cgatgtcgca	gagtatgccg	gtgtctctta	tcagaccgtt	ccccgcgtgg	tgaaccaggc	5040
cagccacgtt	tctgcgaaaa	cgcgggaaaa	agtggaagcg	gcgatggcgg	agctgaatta	5100
cattcccaac	cgcgtggcac	aacaactggc	gggcaaacag	tcgttgctga	ttggcgttgc	5160



```

cacctccagt ctggccctgc acgcgccgtc gcaaattgtc gcggcgatta aatctcgcgc 5220
cgatcaactg ggtgccagcg tgggtggtgtc gatggtagaa cgaagcggcg tcgaagcctg 5280
taaagcggcg gtgcacaatc ttctcgcgca acgcgtcagt gggctgatca ttaactatcc 5340
gctggatgac caggatgcca ttgctgtgga agctgcctgc actaatgttc cggcgttatt 5400
tcttgatgtc tctgaccaga caccatcaa cagtattatt ttctcccatg aagacggtag 5460
gcgactgggc gtggagcatc tggtcgcatt gggtcaccag caaatcgcgc tgtagcggg 5520
cccattaagt tctgtctcgg cgctctcgc tctggctggc tggcataaat atctcactcg 5580
caatcaaatt cagccgatag cggaacggga aggcgactgg agtgccatgt ccggttttca 5640
acaaccatg caaatgctga atgagggcat cgttcccact gcgatgctgg ttgccaacga 5700
tcagatggcg ctgggcgcaa tgcgcgccat taccgagtcc gggctgcgcg ttggtgcgga 5760
tatctcggta gtgggatacg acgataccga agacagctca tgttatatcc cgccgttaac 5820
caccatcaaa caggattttc gcctgctggg gcaaaccagc gtggaccgct tgctgcaact 5880
ctctcagggc caggcgggtga agggcaatca gctgttgccc gtctcactgg tgaaaagaaa 5940
aaccaccctg gcgccaata cgcaaaccgc ctctccccgc gcgttggccg attcattaat 6000
gcagctggca cgacaggttt cccgactgga aagcgggcag tgagcgcaac gcaattaatg 6060
tgagttagct cactcattag gcacccagg ctttacactt tatgcttccg gctcgtatgt 6120
tgtgtggaat tgtgagcgga taacaatttc acacaggaaa cagctatgac catgattacg 6180
gattcactgg ccgtcgtttt acaacgtcgt gactgggaaa accctggcgt tacccaactt 6240
aatcgcttg cagcacatcc ccctttcgcc agctggcgta atagcgaaga ggcccgacc 6300
gatcgccctt cccaacagtt gcgcagcctg aatggcgaat ggcgctttgc ctggtttccg 6360
gcaccagaag cggtgccgga aagctggctg gagtgcgac ttctgaggc cgatactgtc 6420
gtcgtccctt caaactggca gatgcacggt tacgatgcgc ccatctacac caacgtaacc 6480
tatcccatta cggatcaatcc gccgtttggt cccacggaga atccgacggg ttgttactcg 6540
ctcacattta atgttgatga aagctggcta caggaaggcc agacgcgaat tatttttgat 6600
ggcgttg 6607

```

```

<210> 3
<211> 7023
<212> DNA
<213> plasmid pBR322

<400> 3

```

acgttatcga ctgcacggtg caccaatgct tctggcggtca ggcagccatc ggaagctgtg	60
gtatggctgt gcaggtcgta aatcactgca taattcgtgt cgctcaaggc gcactcccgt	120
tctggataat gttttttgcg ccgacatcat aacggttctg gcaaattatc tgaaatgagc	180
tgttgacaat taatcatcgg ctcgtataat gtgtggaatt gtgagcggat aacaatttca	240
cacaggaaac agtacatatg aaaagatcaa aacgatttgc agtactggcc cagcgccccg	300
tcaatcagga cgggctgatt ggcgagtggc ctgaagaggg gctgatcgcc atggacagcc	360
cctttgacct ggtctcttca gtaaaagtgg acaacggtct gatcgtcgaa ctggacggca	420
aacgccggga ccagtttgac atgatcgacc gatttatcgc cgattacgcg atcaacgttg	480
agcgcacaga gcaggcaatg cgcctggagg cggtggaaat agcccgtatg ctggtggata	540
ttcacgtcag ccgggaggag atcattgcc aactaccgc catcacgcc gccaaagcgg	600
tcgaggtgat ggcgcagatg aacgtggtgg agatgatgat ggcgctgcag aagatgcgtg	660
cccgccggac cccctccaac cagtgccacg tcaccaatct caaagataat ccggtgcaga	720
ttgccgctga cgccgccgag gccgggatcc gcggtcttc agaacaggag accacggtcg	780
gtatcgcgcg ctacgcgccg tttaacgccc tggcgctgtt ggtcggttcg cagtgcggcc	840
gccccggcgt gttgacgcag tgctcggtag aagaggccac cgagctggag ctgggcatgc	900
gtggcttaac cagctacgcc gagacggtgt cggcttacgg caccgaagcg gtatttaccg	960
acggcgatga tacgccgtgg tcaaaggcgt tctctgcctc ggctacgcc tcccgggggt	1020
tgaaaatgcg ctacacctcc ggcaccggat ccgaagcgct gatgggctat tcggagagca	1080
agtcgatgct ctacctcgaa tcgcgctgca tcttcattac taaaggcgcc ggggttcagg	1140
gactgcaaaa cggcgcggtg agctgtatcg gcatgaccgg cgctgtgccg tcgggcattc	1200
gggcgggtgct ggcggaaaac ctgatcgctt ctatgctcga cctcgaagtg gcgtccgcca	1260
acgaccagac tttctccac tcggatattc gccgcaccgc gcgcaccctg atgcagatgc	1320
tgccgggcac cgactttatt ttctccggct acagcgcggt gccgaactac gacaacatgt	1380
tcgccggctc gaacttcgat gcggaagatt ttgatgatta caacatcctg cagcgtgacc	1440
tgatggttga cggcggcctg cgtccggtga ccgaggcgga aaccattgcc attcgccaga	1500
aagcggcgcg ggcgatccag gcggttttcc gcgagctggg gctgccgcca atcgccgacg	1560
aggaggtgga ggccgccacc tacgcgcacg gcagcaacga gatgccgccg cgtaacgtgg	1620
tggaggatct gagtgcggtg gaagagatga tgaagcgcaa catcacgggc ctcgatattg	1680
tcggcgcgct gagccgcagc ggctttgagg atatcgccag caatattctc aatatgctgc	1740

gccagcgggt caccggcgat tacctgcaga cctcggccat tctcgatcgg cagttcgagg	1800
tggtgagtgc ggtcaacgac atcaatgact atcaggggcc gggcaccggc tatcgcatct	1860
ctgccgaacg ctggggcggag atcaaaaata ttccgggcgt ggttcagccc gacaccattg	1920
aataaggcgg tattcctgtg caacagacaa cccaaattca gccctctttt accctgaaaa	1980
cccgcgaggg cggggtagct tctgccgatg aacgcgccga tgaagtgggtg atcggcgctcg	2040
gccctgcctt cgataaacac cagcatcaca ctctgatcga tatgccccat ggcgcgatcc	2100
tcaaagagct gattgccggg gtggaagaag aggggcttca cgcccgggtg gtgcgcattc	2160
tgcgcacgtc cgacgtctcc tttatggcct gggatgcggc caacctgagc ggctcgggga	2220
tcggcatcgg tatccagtcg aaggggacca cggtcaccca tcagcgcgat ctgctgccgc	2280
tcagcaacct ggagctgttc tcccaggcgc cgctgctgac gctggagacc taccggcaga	2340
ttggcaaaaa cgctgcgcgc tatgcgcgca aagagtcacc ttcgccgggtg ccggtgggtga	2400
acgatcagat ggtgcggccg aaatttatgg ccaaagccgc gctatttcat atcaaagaga	2460
ccaaacatgt ggtgcaggac gccgagcccc tcacctgca catcgactta gtaaggagat	2520
gaccatgagc gagaaaacca tgcgcgtgca ggattatccg ttagccacc gctgcccgga	2580
gcatatcctg acgcctaccg gcaaaccatt gaccgatatt accctcgaga aggtgctctc	2640
tggcgaggtg ggcccgcagg atgtgcggat ctcccgccag acccttgagt accaggcgca	2700
gattgccgag cagatgcagc gccatgcggt ggcgcgcaat ttccgccgcg cggcggagct	2760
tatcgccatt cctgacgagc gcattctggc tatctataac gcgctgcgcc cgttccgctc	2820
ctcgcaggcg gagctgctgg cgatcgccga cgagctggag cacacctggc atgcgacagt	2880
gaatgccgcc tttgtccggg agtcggcgga agtgtatcag cagcggcata agctgcgtaa	2940
aggaagctaa gcggaggtca gcatgccgtt aatagccggg attgataatt ccgggcccgt	3000
cgacagatcc ccgggaattc atcgtgactg actgacgatc tgcctcgcgc gtttcggtga	3060
tgacggtgaa aacctctgac acatgcagct cccggagacg gtcacagctt gtctgtaagc	3120
ggatgccggg agcagacaag cccgtcaggg cgcgtcagcg ggtgttggcg ggtgtcgggg	3180
cgcagccatg acccagtcac gtagcgatag cggagtgtat aattcttgaa gacgaaaggg	3240
cctcgtgata cgcctatttt tataggttaa tgtcatgata ataatggttt cttagacgtc	3300
aggtggcact tttcggggaa atgtgcgcgg aaccctatt tgtttatttt tctaaataca	3360
ttcaaatatg tatccgctca tgagacaata accctgataa atgcttcaat aatattgaaa	3420

aaggaagagt atgagtattc aacattttccg tgtcgcctt attccctttt ttgcggcatt	3480
ttgccttcct gtttttgctc acccagaaac gctggtgaaa gtaaaagatg ctgaagatca	3540
gttgggtgca cgagtgggtt acatcgaact ggatctcaac agcggtaaga tccttgagag	3600
ttttcgcccc gaagaacgtt ttccaatgat gagcactttt aaagttctgc tatgtggcgc	3660
ggtattatcc cgtgttgacg ccgggcaaga gcaactcggc cgccgcatac actatttctca	3720
gaatgacttg gttgagtact caccagtcac agaaaagcat cttacggatg gcatgacagt	3780
aagagaatta tgcagtgtg ccataaccat gagtataac actgcggcca acttacttct	3840
gacaacgatc ggaggaccga aggagctaac cgcttttttg cacaacatgg gggatcatgt	3900
aactcgcctt gatcgttggg aaccggagct gaatgaagcc ataccaaagc acgagcgtga	3960
caccacgatg cctgcagcaa tggcaacaac gttgcgcaaa ctattaactg gcgaactact	4020
tactctagct tcccggcaac aattaataga ctggatggag gcggataaag ttgcaggacc	4080
acttctgcgc tcggcccttc eggctggctg gtttattgct gataaatctg gagccggtga	4140
gcgtgggtct cgcggtatca ttgcagcact ggggccagat ggtaagccct cccgtatcgt	4200
agttatctac acgacgggga gtcaggcaac tatggatgaa cgaaatagac agatcgctga	4260
gataggtgcc tctactgatta agcattggta actgtcagac caagtttact catatatact	4320
ttagattgat ttaaaacttc atttttaatt taaaaggatc taggtgaaga tcctttttga	4380
taatctcatg accaaaatcc cttaacgtga gttttcgttc cactgagcgt cagaccccg	4440
agaaaagatc aaaggatctt cttgagatcc tttttttctg cgcgtaatct gctgcttgca	4500
aacaaaaaaaa ccaccgctac cagcgggtgt ttggttgccg gatcaagagc taccaactct	4560
ttttccgaag gtaactggct tcagcagagc gcagatacca aatactgtcc ttctagtgtg	4620
gccgtagtta ggccaccact tcaagaactc tgtagcaccg cctacatacc tcgctctgct	4680
aatcctgtta ccagtggctg ctgccagtgg cgataagtcg tgtcttaccg ggttggaactc	4740
aagacgatag ttaccggata aggcgcagcg gtcgggctga acgggggggt cgtgcacaca	4800
gcccagcttg gagcgaacga cctacaccga actgagatac ctacagcgtg agctatgaga	4860
aagcgccacg cttcccgaag ggagaaaggc ggacaggtat ccggtgaagc gcagggctcg	4920
aacaggagag cgcacgagg agcttccagg gggaaacgcc tggatatctt atagtctgt	4980
cggttttcgc cacctctgac ttgagcgtcg atttttgtga tgctcgtcag gggggcggag	5040
cctatggaaa aacgccagca acgcggcctt ttacgggttc ctggcctttt gctggccttt	5100
tgctcacatg ttctttctg cgttatcccc tgattctgtg gataaccgta ttaccgcctt	5160

tgagtgagct gataccgctc gccgcagccg aacgaccgag cgcagcgagt cagtgagcga	5220
ggaagcggaa gagcgctga tgcggtatct tctccttacg catctgtgcg gtatttcaca	5280
ccgcataaat tccgacacca tcgaatgggtg caaaccttt cgcggtatgg catgatagcg	5340
cccggaagag agtcaattca ggggtggtaga tgtgaaacca gtaacgttat acgatgtcgc	5400
agagtatgcc ggtgtctctt atcagaccgt tccccgcgtg gtgaaccagg ccagccacgt	5460
ttctgcgaaa acgcgggaaa aagtggaaagc ggcgatggcg gagctgaatt acattcccaa	5520
ccgcgtggca caacaactgg cgggcaaaca gtcgttgctg attggcgctg ccacctccag	5580
tctggccctg cacgcgccgt cgcaaattgt cgcggcgatt aaatctcgcg ccgatcaact	5640
gggtgccagc gtgggtgggtg cgatggtaga acgaagcggc gtcgaagcct gtaaagcggc	5700
ggtgcacaat cttctcgcgc aacgcgtcag tgggctgata attaaactat cgctggatga	5760
ccaggatgcc attgctgtgg aagctgcctg cactaatgtt ccggcgcttat ttcttgatgt	5820
ctctgaccag acacccatca acagtattat tttctcccat gaagacggta cgcgactggg	5880
cgtggagcat ctggtcgcat tgggtcacca gcaaactcgc ctgttagcgg gccattaag	5940
ttctgtctcg gcgcgtctgc gtctggctgg ctggcataaa tatctcactc gcaatcaaat	6000
tcagccgata gcggaacggg aaggcgactg gagtgccatg tccggttttc aacaaacct	6060
gcaaattgctg aatgagggca tcgttccac tgcatgctg gttgccaacg atcagatggc	6120
gctgggcgca atgcgcgcca ttaccgagtc cgggctgcgc gttgggtgcgg atatctcggt	6180
agtgggatac gacgataccg aagacagctc atgttatatc ccgccgttaa ccaccatcaa	6240
acaggatctt cgctgtctgg ggcaaaccag cgtggaccgc ttgctgcaac tctctcaggg	6300
ccaggcgggtg aagggaatc agctgttgcc cgtctcactg gtgaaaagaa aaaccaccct	6360
ggcgcccaat acgcaaaccg cctctccccg cgcgttgcc gattcattaa tgcagctggc	6420
acgacagggt tcccgactgg aaagcgggca gtgagcgcaa cgcaattaat gtgagttagc	6480
tactcatta ggcaccccag gctttacact ttatgcttcc ggctcgtatg ttgtgtggaa	6540
ttgtgagcgg ataacaattt cacacaggaa acagctatga ccatgattac ggattcactg	6600
gccgtcgctt tacaacgtcg tgactgggaa aaccctggcg ttaccaact taatcgctt	6660
gcagcacatc cccctttcgc cagctggcgt aatagcgaag aggccgcac cgatcgccct	6720
tccaacagt tgcgcagcct gaatggcgaa tggcgctttg cctgggtttcc ggcaccagaa	6780
gcggtgccgg aaagctggct ggagtgcgat cttcctgagg ccgatactgt cgtcgtcccc	6840

tcaaactggc agatgcacgg ttacgatgcg cccatctaca ccaacgtaac ctatcccatt	6900
acgggtcaatc cgccgtttgt tcccacggag aatccgacgg gttgttactc gtcacattt	6960
aatgttgatg aaagctggct acaggaaggc cagacgcgaa ttatTTTTga tggcgttgga	7020
att	7023

<210> 4  
 <211> 6608  
 <212> DNA  
 <213> plasmid p15A

<400> 4	
gaattaattc tggcgaatcc tctgaccagc cagaaaacga ctttctgtg gtgaaaccgg	60
atgctgcaat tcagagcgcc agcaagtggg ggacagcaga agacctgacc gccgcagagt	120
ggatgtttga catggtgaag actatcgac catcagccag aaaaccgaat ttgctgggt	180
gggctaacga tatccgcctg atgctgaac gtgacggacg taaccaccgc gacatgtgtg	240
tgctgttccg ctgggcatgc caggacaact tctgggtccg taacgtgctg agcccgcca	300
agcttactcc ccatccccct gttgacaatt aatcatcggc tcgtataatg tgtggaattg	360
tgagcggata acaatttcac acaggaaaca ggatcctagg aggtttaaac atatgtcgct	420
ttcaccgcca ggcgtacgcc tgttttacga tccgcgcggg caccatgccg gcgccatcaa	480
tgagctgtgc tgggggctgg aggagcaggg ggtccctgc cagaccataa cctatgacgg	540
aggcggtgac gccgctgcgc tgggcgccct ggcggccaga agctcgcccc tgcgggtggg	600
tatcgggctc agcgcgtccg gcgagatagc cctcactcat gccagctgc cggcggacgc	660
gocgctggct accggacacg tcaccgatag cgacgatcaa ctgcgtacgc tcggcgccaa	720
cgccgggcag ctggttaaag tctgcccgtt aagtgcgaga aactgaagat cctaggaggt	780
ttaaacatat gccgttaata gccgggattg atatcgcaa cgccaccacc gaggtggcgc	840
tggcgtccga ctaccgcag gcgagggcgt ttgttgccag cgggatcgtc gcgacgacgg	900
gcatgaaagg gacgcgggac aatatcgccg ggaccctgc cgcgctggag caggccctgg	960
cgaaaacacc gtggtcgatg agcgatgtct ctgcgcatcta tcttaacgaa gccgcgccgg	1020
tgattggcga tgtggcgatg gagaccatca ccgagaccat tatcaccgaa tcgaccatga	1080
tcggtcataa cccgcagacg ccgggcgggg tgggcgttgg cgtggggacg actatcgccc	1140
tcgggcggct ggcgacgctg ccggcggcgc agtatgccga ggggtggatc gtactgattg	1200
acgacgcgct cgatttcctt gacgcgctgt ggtggctcaa tgaggcgcgc gaccggggga	1260

tcaacgtggt ggcggcgatc ctcaaaaagg acgacggcgt gctggtgaac aaccgcctgc	1320
gtaaaaccct gccggtggtg gatgaagtga cgctgctgga gcagggtccc gagggggtaa	1380
tggcggcggt ggaagtggcc gcgccgggcc aggtggtgcg gatcctgtcg aatccctacg	1440
ggatcgccac cttcttcggg ctaagcccgg aagagacca ggccatcgtc cccatcgccc	1500
gcgccctgat tggcaaccgt tccgcggtgg tgctcaagac cccgcagggg gatgtgcagt	1560
cgcgggtgat cccggcgggc aacctctaca ttagcggcga aaagcgcgc ggagaggccg	1620
atgtcgccga gggcgcgga gccatcatgc aggcgatgag cgcctgcgct ccggtacgcg	1680
acatccgcgg cgaaccgggc acccacgccg gcggcatgct tgagcgggtg cgcaaggtaa	1740
tggcgtccct gaccggccat gagatgagcg cgatatacat ccaggatctg ctggcgggtg	1800
atacgtttat tccgcgcaag gtgcagggcg ggatggccgg cgagtgcgc atggagaatg	1860
ccgtcgggat ggcggcgatg gtgaaagcg atcgtctgca aatgcaggtt atcgcccgcg	1920
aactgagcgc ccgactgcag accgaggtgg tgggtggcg cgtggaggcc aacatggcca	1980
tcgccggggc gttaaccact cccggctgtg cggcgccgct ggcgatcctc gacctcggcg	2040
ccggctcgac ggatgcggcg atcgtcaacg cggaggggca gataacggcg gtccatctcg	2100
ccggggcggg gaatatggtc agcctgttga ttaaaaccga gctgggcctc gaggatcttt	2160
cgtggcgga agcgataaaa aaataccgc tggccaaagt ggaaagcctg ttcagtattc	2220
gtcacgagaa tggcgcggtg gagttctttc gggaagccct cagcccggcg gtgttcgcca	2280
aagtgggtgta catcaaggag ggcgaactgg tgccgatcga taacgccagc ccgctgga	2340
aaattcgtct cgtgcgccg caggcgaaag agaaagtgtt tgtcaccaac tgcctgcgcg	2400
cgtgcgcca ggtctcacc gccgggtcca ttcgcgatat cgcctttgtg gtgctggtgg	2460
gcggctcatc gctggacttt gagatccgc agcttatcac ggaagccttg tcgcactatg	2520
gcgtggtcgc cgggcagggc aatattcggg gaacagaagg gccgcgcaat gcggtcgcca	2580
ccgggctgct actggccggc caggcgaatt aaagatctcg ggtagccgc ctaatgagcg	2640
ggcttttttt tatgagaatt acaacttata tcgtatggg ctgacttcag gtgctacatt	2700
tgaagagata aattgcactg aaatctagaa atattttatc tgattaataa gatgatcttc	2760
ttgagatcgt tttggtctgc gcgtaatctc ttgctctgaa aacgaaaaaa ccgccttgca	2820
ggcggttttt togaaggttc tctgagctac caactctttg aaccgaggta actggcttgg	2880
aggagcgcag tcacaaaaac ttgtcctttc agtttagcct taaccggcgc atgacttcaa	2940
gactaactcc tctaaatcaa ttaccagtgg ctgctgccag tgggtgctttt gcatgtcttt	3000

ccgggttggga ctcaagacga tagttaccgg ataaggcgca gcggtcggac tgaacggggg	3060
gttcgtgcat acagtccagc ttggagcgaa ctgcctaccc ggaactgagt gtcaggcgtg	3120
gaatgagaca aacgcggcca taacagcgga atgacaccgg taaaccgaaa ggcaggaaca	3180
ggagagcgca cgaggggagcc gccaggggga aacgcctggt atctttatag tcctgtcggg	3240
tttcgccacc actgatttga gcgtcagatt tcgtgatgct tgtcaggggg gcggagccta	3300
tggaaaaacg gctttgccgc ggccctctca cttccctggt aagtatcttc ctggcatctt	3360
ccaggaaatc tccgccccgt tcgtaagcca tttccgctcg ccgcagtcga acgaccgagc	3420
gtagcgagtc agtgagcgag gaagcggaat atatcctgta tcacatattc tgctgacgca	3480
ccggtgcagc cttttttctc ctgccacatg aagcacttca ctgacaccct catcagtgcc	3540
aacatagtaa gccagtatac actccgctag cgctgatgtc cggcggtgct tttgccgtta	3600
cgcaccaccc cgtcagtagc tgaacaggag ggacagctga tagaaacaga agccactgga	3660
gcacctcaaa aacaccatca taaactaaat cagtaagttg gcagcatcac ccgacgcact	3720
ttgcgccgaa taaataacctg tgacggaaga tcacttcgca gaataaataa atcctgggtg	3780
ccctgttgat accgggaagc cctgggccaa cttttggcga aaatgagacg ttgatcggca	3840
cgtaagaggt tccaactttc accataatga aataagatca ctaccgggcg tattttttga	3900
gttatcgaga ttttcaggag ctaaggaagc taaaatggag aaaaaaatca ctggatatac	3960
caccgttgat atatcccaat ggcacgtgaa agaacatttt gaggcatttc agtcagttgc	4020
tcaatgtacc tataaccaga ccgttcagct ggatattacg gcctttttaa agaccgtaaa	4080
gaaaaataag cacaagtttt atccggcctt tattcacatt cttgcccgcc tgatgaatgc	4140
tcatccggaa tttcgtatgg caatgaaaga cggtgagctg gtgatatggg atagtgttca	4200
cccttgttac accgtttttc atgagcaaac tgaaacgttt tcatcgctct ggagtgaata	4260
ccacgacgat ttccggcagt ttctacacat atattcgcaa gatgtggcgt gttacgggtga	4320
aaacctggcc tatttcccta aagggtttat tgagaatatg tttttcgtct cagccaatcc	4380
ctgggtgagt ttcaccagtt ttgatttaaa cgtggccaat atggacaact tcttcgcccc	4440
cgttttcacc atgggcaaat attatacgca aggcgacaag gtgctgatgc cgctggcgat	4500
tcaggttcat catgccgtct gtgatggctt ccatgtcggc agaatgctta atgaattaca	4560
acagtactgc gatgagtggc agggcggggc gtaatttttt taaggcagtt attggtgccc	4620
ttaaacgcct ggtgctacgc ctgaataagt gataataagc ggatgaatgg cagaaattcg	4680



aaagcaaatt cgacccggtc gtcggttcag ggcagggctc ttaaatagcc gcttatgtct	4740
attgctgggtt taccggttta ttgactaccg gaagcagtgt gaccgtgtgc ttctcaaattg	4800
cctgaggcca gtttgctcag gctctccccg tggaggtaat aattgacgat atgatcattt	4860
attctgcctc ccaaagcaat tccgacacca tcgaatgggtg caaaaccttt cgcggtatgg	4920
catgatagcg cccggaagag agtcaattca ggggtggtgaa tgtgaaacca gtaacgttat	4980
acgatgtcgc agagtatgcc ggtgtctctt atcagaccgt ttcccgcgtg gtgaaccagg	5040
ccagccacgt ttctgcgaaa acgcgggaaa aagtggaaagc ggcgatggcg gagctgaatt	5100
acattcccaa ccgctgggca caacaactgg cgggcaaaca gtcgttgctg attggcgttg	5160
ccacctccag tctggccctg cacgcgccgt cgcaaattgt cgcggcgatt aaatctcgcg	5220
ccgatcaact ggggtgccagc gtggtggtgt cgatggtaga acgaagcggc gtcgaagcct	5280
gtaaagcggc ggtgcacaat cttctcgcgc aacgcgtcag tgggctgac attaaactatc	5340
cgctggatga ccaggatgcc attgctgtgg aagctgcctg cactaatgtt ccggcgttat	5400
ttcttgatgt ctctgaccag acacccatca acagtattat tttctcccat gaagacggta	5460
cgcgactggg cgtggagcat ctggtcgcat tgggtcacca gcaaatcgcg ctgttagcgg	5520
gcccattaag ttctgtctcg gcgcgtctgc gtctggctgg ctggcataaa tatctcactc	5580
gcaatcaaat tcagccgata gcggaacggg aaggcgactg gagtgccatg tccggttttc	5640
aacaaacccat gcaaattctg aatgagggca tcgttcccac tgcgatgctg gttgccaacg	5700
atcagatggc gctgggcgca atgcgcgcca ttaccgagtc cgggctgcgc gttggtgcgg	5760
atatctcggg agtgggatac gacgataccg aagacagctc atgttatatc ccgccgttaa	5820
ccaccatcaa acaggatttt cgctgtctgg ggcaaaccag cgtggaccgc ttgctgcaac	5880
tctctcaggg ccaggcgggtg aagggcaatc agctgttgcc cgtctcactg gtgaaaagaa	5940
aaaccacctt ggcgcccaat acgcaaaccg cctctccccg cgcgttggcc gattcattaa	6000
tgcagctggc acgacaggtt tcccgaactg aaagcgggca gtgagcgcaa cgcaattaat	6060
gtgagttagc tactcatta ggcacccag gctttacact ttatgcttcc ggctcgtatg	6120
ttgtgtggaa ttgtgagcgg ataacaattt cacacaggaa acagctatga ccatgattac	6180
ggattcactg gccgtcgttt tacaacgtcg tgactgggaa aaccctggcg ttaccaact	6240
taatcgctt gcagcacatc cccctttcgc cagctggcgt aatagcgaag aggcccgcac	6300
cgatcgccct tcccaacagt tgcgcagcct gaatggcgaa tggcgctttg cctggtttcc	6360
ggcaccagaa gcggtgccgg aaagctggct ggagtgcgat cttcctgagg ccgatactgt	6420

cgtcgtcccc tcaaactggc agatgcacgg ttacgatgcg cccatctaca ccaacgtaac	6480
ctatcccatt acggtcaatc cgccgtttgt tcccacggag aatccgacgg gttgttactc	6540
gctcacattht aatgttgatg aaagctggct acaggaaggc cagacgcgaa ttatttttga	6600
tggcgttg	6608